

CLAIMS

We claim:

1. A display integrated with a substrate, comprising:
 - a substrate having a first surface and a second surface;
 - said substrate defining at least penetration through said substrate;
 - said penetration having a side wall, an entrance opening, and an exit opening;
 - a light source associated with said entrance opening, said light source adapted to selectively introduce light to said penetration via said entrance opening.
2. The apparatus of claim 1 wherein said substrate is of substantially uniform thickness.
3. The apparatus of claim 1 wherein said substrate is of varying cross-section.
4. The apparatus of claim 1 wherein said substrate comprises a printed wiring board.
5. The apparatus of claim 1 wherein said substrate comprises a user interface panel.

6. The apparatus of claim 1 wherein said side wall is covered with a substantially opaque material.
7. The apparatus of claim 6 wherein said substantially opaque material is a reflective material.
8. The apparatus of claim 7 wherein said reflective material is a paint.
9. The apparatus of claim 7 wherein said reflective material is a reflective coating.
10. The apparatus of claim 1 further comprising a light guide within said penetration.
11. The apparatus of claim 10 wherein said light guide comprises a material having a high index of refraction.
12. The apparatus of claim 11 wherein said material having a high index of refraction comprises a light transmissive epoxy.
13. The apparatus of claim 10 wherein said substrate comprises a substantially opaque material.

14. The apparatus of claim 10 wherein said substrate comprises a material substantially impervious to light transmission.
15. The apparatus of claim 1 further comprising a light diffuser associated with said exit opening of said bore.
16. The apparatus of claim 15 wherein said diffuser comprises a layer of light transmissive material applied over said exit opening.
17. The apparatus of claim 1 wherein said light source comprises a light emitting diode.
18. The apparatus of claim 1 wherein said light source comprises a lamp.
19. The apparatus of claim 1 wherein said light source comprises an OLED.
20. The apparatus of claim 1 wherein said light source comprises a PLED.
21. The apparatus of claim 1 wherein said display comprises a single element defined by a single aperture.
22. The apparatus of claim 1 wherein said display comprises plural elements defined by plural apertures.

23. The apparatus of claim 1 further comprising at least one electronic component mounted on said substrate.
24. The apparatus of claim 23 wherein said electronic component comprises a sensor.
25. The apparatus of claim 24 wherein said sensor comprises at least a first electrode disposed on said substrate.
26. The apparatus of claim 25 wherein said sensor further comprises a second electrode disposed on said substrate.
27. The apparatus of claim 25 wherein said sensor further comprises an active component electrically coupled to said first electrode.
28. The apparatus of claim 25 wherein said sensor further comprises an integrated control circuit electrically coupled to said first electrode.
29. A display integrated with a substrate, comprising:
 - a substrate having a first surface and a second surface;
 - said substrate defining at least one cavity;
 - said cavity having a side wall, an entrance opening, and a closed end;

a light source associated with said entrance opening, said light source adapted to selectively introduce light to said cavity via said entrance opening.

30. The apparatus of claim 29 wherein said substrate is of substantially uniform thickness.

31. The apparatus of claim 29 wherein said substrate is of varying cross-section.

32. The apparatus of claim 29 wherein said substrate comprises a printed wiring board.

33. The apparatus of claim 29 wherein said substrate comprises a user interface panel.

34. The apparatus of claim 29 wherein said side wall is covered with a substantially opaque material.

35. The apparatus of claim 34 wherein said substantially opaque material is a reflective material.

36. The apparatus of claim 35 wherein said reflective material is a paint.

37. The apparatus of claim 35 wherein said reflective material is a reflective coating.

38. The apparatus of claim 29 further comprising a light guide within said penetration.

39. The apparatus of claim 38 wherein said light guide comprises a material having a high index of refraction.

40. The apparatus of claim 39 wherein said material having a high index of refraction comprises a light transmissive epoxy.

41. The apparatus of claim 38 wherein said substrate comprises a substantially opaque material.

42. The apparatus of claim 38 wherein said substrate comprises a material substantially impervious to light transmission.

43. The apparatus of claim 29 further comprising a light diffuser associated with said exit opening of said bore.

44. The apparatus of claim 43 wherein said diffuser comprises a layer of light transmissive material applied over said exit opening.

45. The apparatus of claim 29 wherein said light source comprises a light emitting diode.
46. The apparatus of claim 29 wherein said light source comprises a lamp.
47. The apparatus of claim 29 wherein said light source comprises an OLED.
48. The apparatus of claim 29 wherein said light source comprises a PLED.
49. The apparatus of claim 29 wherein said display comprises a single element defined by a single aperture.
50. The apparatus of claim 29 wherein said display comprises plural elements defined by plural apertures.
51. The apparatus of claim 29 further comprising at least one sensor mounted on said substrate.
52. The apparatus of claim 51 wherein said sensor comprises at least a first electrode disposed on said substrate.

53. The apparatus of claim 52 wherein said sensor further comprises a second electrode disposed on said substrate.

54. The apparatus of claim 52 wherein said sensor further comprises an active component electrically coupled to said first electrode.

55. The apparatus of claim 52 wherein said sensor further comprises an integrated control circuit electrically coupled to said first electrode.